



Achieving Quality in IT



Quality Methods

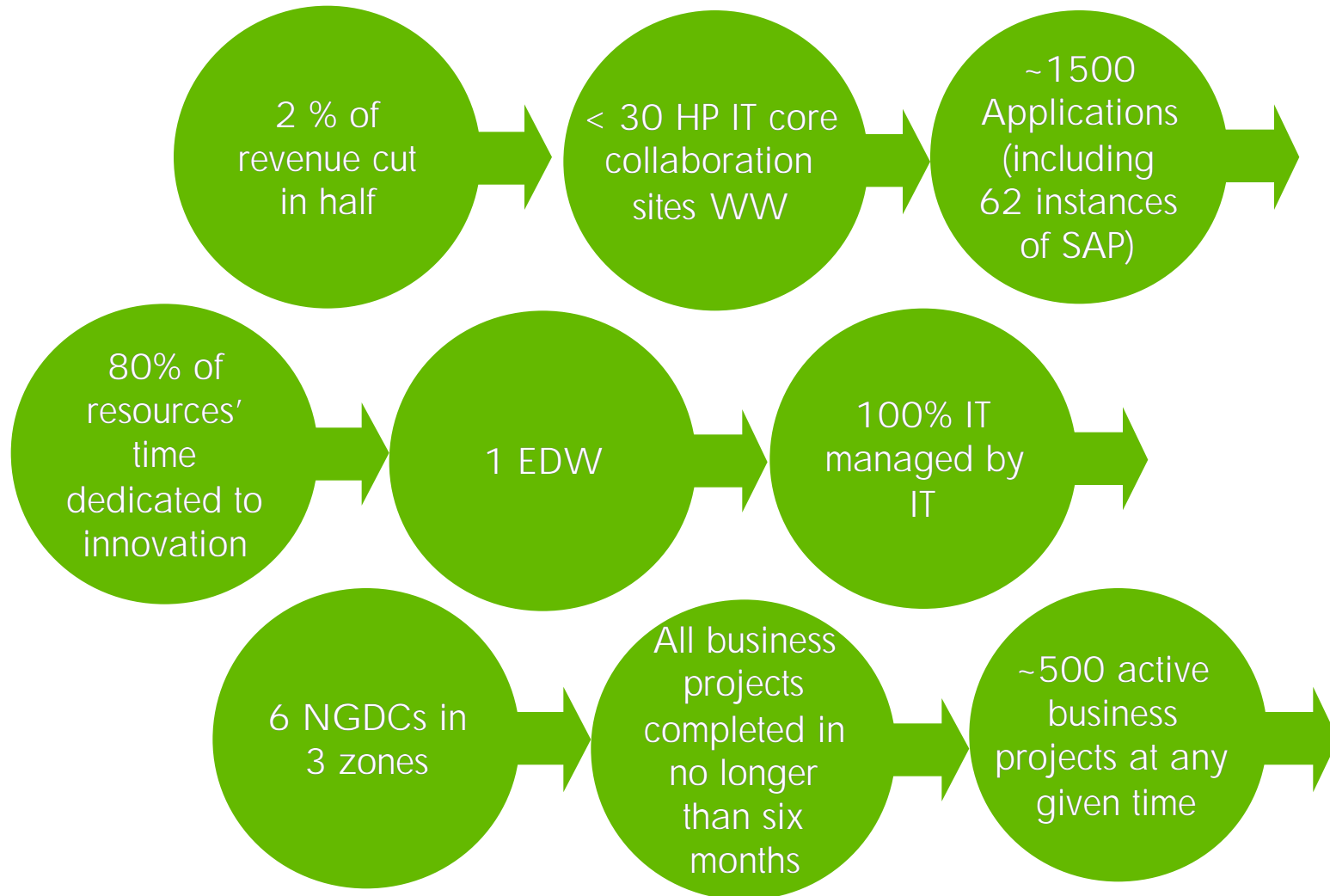
William Dupley
IT Strategist
Hewlett-Packard Canada

Agenda

1. Introduction into HP software production
2. Industry quality findings
3. HP quality improvement goals & metrics
4. HP quality improvement program results
5. Quality improvement strategies
 - Applications: HPME software development process
 - Applications: SLIM tools architecture
 - Applications: Test strategies
 - Operations: Management strategies
- 5 Quality improvement recommendations



HP IT 2008: Streamlined and focused



HP Printer Firmware

Best of mono and color in one device: The HP department MFP that delivers best in-class performance, reliability, and cost.

- 2.5 – 3 million lines of code
- Must produce an new set of features every month
- 150- 160 developer team working in a virtual global team



Industry Software Quality issues

The Economist Intelligence Unit , the Standish Group, Chaos and Gartner, have found some very disturbing facts about our industry. They have found:

- 41% of IT professionals surveyed said that half or fewer of IT initiatives had a positive impact on the business ¹
- 74% of large, high priority projects are deemed to be challenged or failed. ²
- 80% of issues in production are self inflicted ³
- 75% of IT is spent on maintenance and support ⁴

¹ Survey by the Economist Intelligence Unit of 1,125 IT professionals based in the Americas, Europe, the Middle East and Asia-Pacific June 2008
(Q: Approximately what percentage of IT initiatives undertaken in your company over the past three years has had a positive impact on the business?)
² Standish Group, Chaos Chronicles Online: 2-0: Executive Support, 2007.
³ Gartner, From Concept to Production, Software Changes and Configuration Management, April 2008
⁴ Forrester, Data Center Automation Defined, February 2008



Quality Issues and defects finding

HP has found the following issues in it's own research

Applications

- 20-25% issues of are code defects
- 10% are data problems
- 13% are environment issues
- 52% are other problems
 - User misunderstood
 - Errors in test cases
 - Errors in documentation

Infrastructure

- Variation of infrastructure and operating systems
- Age of Infrastructure, operating systems
- Insufficient Infrastructure capacity
- Exceeding the technical architecture of the application

HP Seven Software Improvement Quality Goals

Improve Project on-time delivery

Through more disciplined requirements management and better estimating techniques

Improve code quality and reduce support costs

Via disciplined test management

Improve developer productivity and reduce cost

With robust, integrated processes and tools (HPME, SLIM)

Improve ability to move resources between projects

By standard global methodologies & development artifacts

By Common resource management

By Common vocabulary (Process, Defect etc.)

Improve overall service performance

Using metrics to set goals and measure progress

By standardizing all Infrastructure

Trace all business requirements to all work products

By integrating end to end traceability tools

Maximize World Wide workgroup productivity

- By standardizing work model for Design, Construction and Test



Software Quality Innovation Metrics Examples

- Requirements volatility
- Requirements traceability
- Delivered defect density
- Defect removal efficiency
- Productivity
- Process Compliance

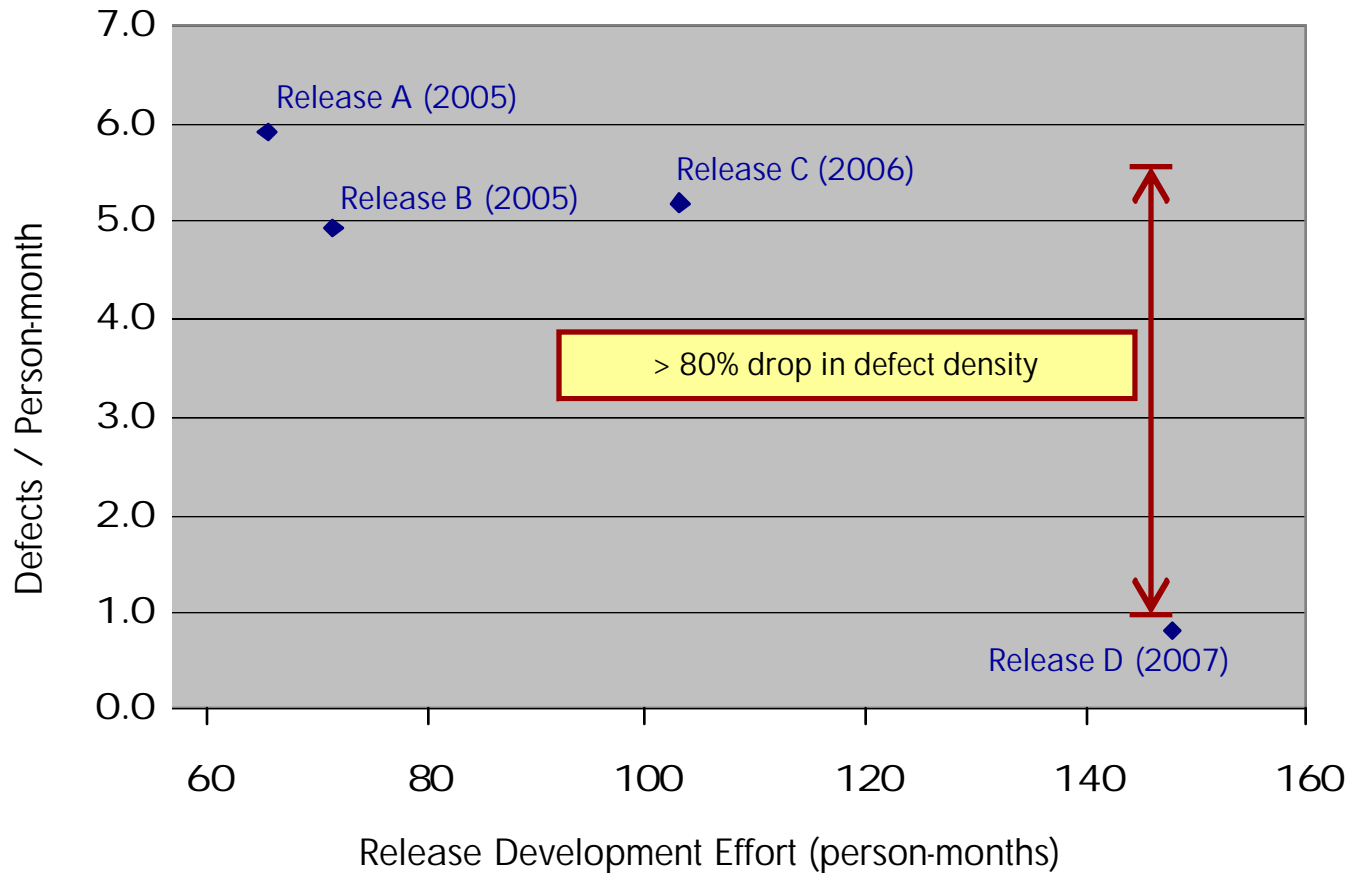
HP Quality Improvement program results:

1. Global Internet Catalog Application

- Automated catalog development and management solution enabling region-, segment- and customer-specific catalogs for the eCommerce environment
- 7 years old; substantial legacy code base
 - Upgrades required for DCC
 - Long term scalability issues require deeper re-architecture
- Technology: J2EE + Oracle
 - Code base
 - ~300 KLOC Java
 - WebLogic + Resin (legacy)
 - ~200 KLOC PL/SQL
 - DB
 - ~1500 tables
 - ~ 1 TB
- Interfaces
 - Inputs: From ~20 assets
 - Outputs: To ~10 assets



Catalog Application results: Release C to Release D: Major lifecycle advance yields major quality improvement



Quality Improvement Strategy: HPME & SLIM

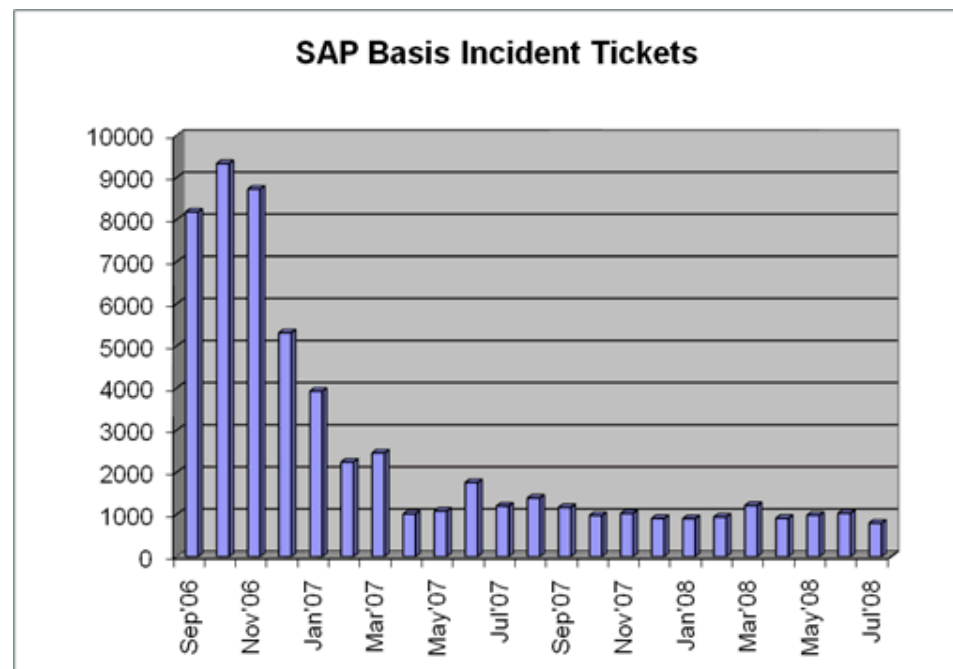
Release development effort excludes effort of
QA team and project and release management



2. SAP Incident reduction results



- At HP, these mission critical applications cross businesses and include IPG's ASTRO Customer Relationship Management (the largest CRM system on earth), IPG's Home & Home Office web store, Supply Chain's Fusion and Velocity systems, TSG's Order Management systems, Finance's Lighthouse, and HP's tax systems. Together, these applications encompass 62 mission critical production ecosystems supporting 40,000+ users, using almost 1,200 TB of disk space across multiple Superdomes and approximately 600 other large servers.



3. Oracle Uptime improved...



HP's database environments and fully utilizing our new NGDC monitoring solutions. This proactive approach, along with related operational improvements, have resulted in a reduction of the number of database related outages for mission critical applications. The outages dropped from 59 in February, to only eight in July, subsequently reducing unavailability from 213 hours in February, to approximately 22 hours in July.

How GDBA team reduced mission critical outages:

- Monthly health-checks on mission critical databases, evaluating key metrics around capacity, parameter settings, account expirations, etc., then reviewing required changes with application support teams
- Implemented Storage Lifeline process, jointly with ITIO's Core Infrastructure Services, nearly eliminating data storage-related outages since May
- Actively monitoring DB status with tools such as Oracle Enterprise Mgr

Quality Improvement Strategy: Operations Management



4. Firmware Releases

- Release new function sets every 4 weeks (1 month sprint)
- 67% improvement in time to release
- 345% improvement # of lines code produced annually per employee
- Dramatically reduced WIP

Quality Improvement Strategy: Six Sigma, Lean & Theory of Constraints



HP Quality Improvement Strategies

HP Lean Sigma Improvement Culture Tools

Tools commonly used in an improvement culture

1. Six Sigma
Reduce Variation
Problem Focused

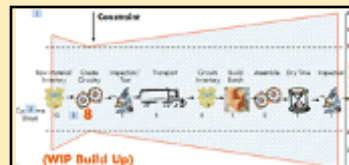
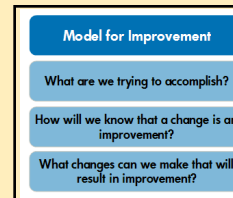
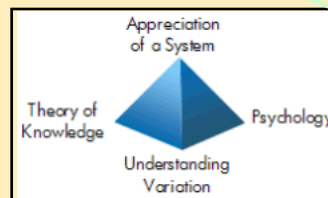
2. Theory of Constraints
Manage Constraints
Systems Constraints Focused

3. Lean Method
Remove Waste & Speed
Flow Focused

System of Profound Knowledge

"The Three Questions" / Model for Improvement

Learning Cycles



Theory of Constraints/
Bottleneck Management/
Quick Changeover

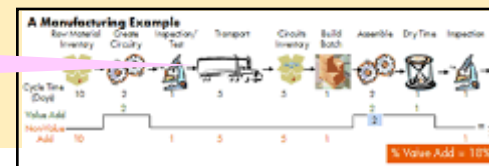


Eyes For Waste

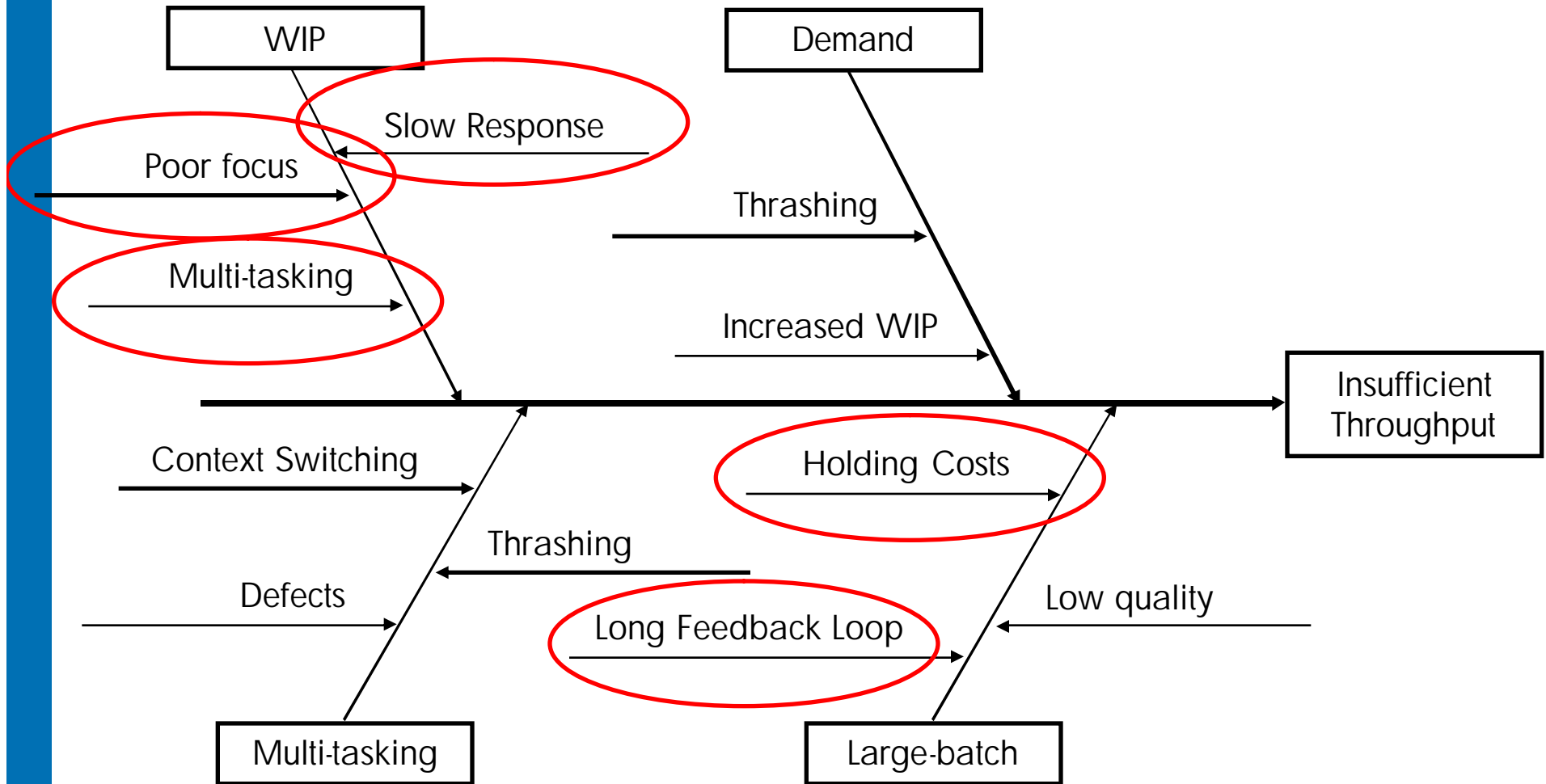
5 S
(shop floor focus)



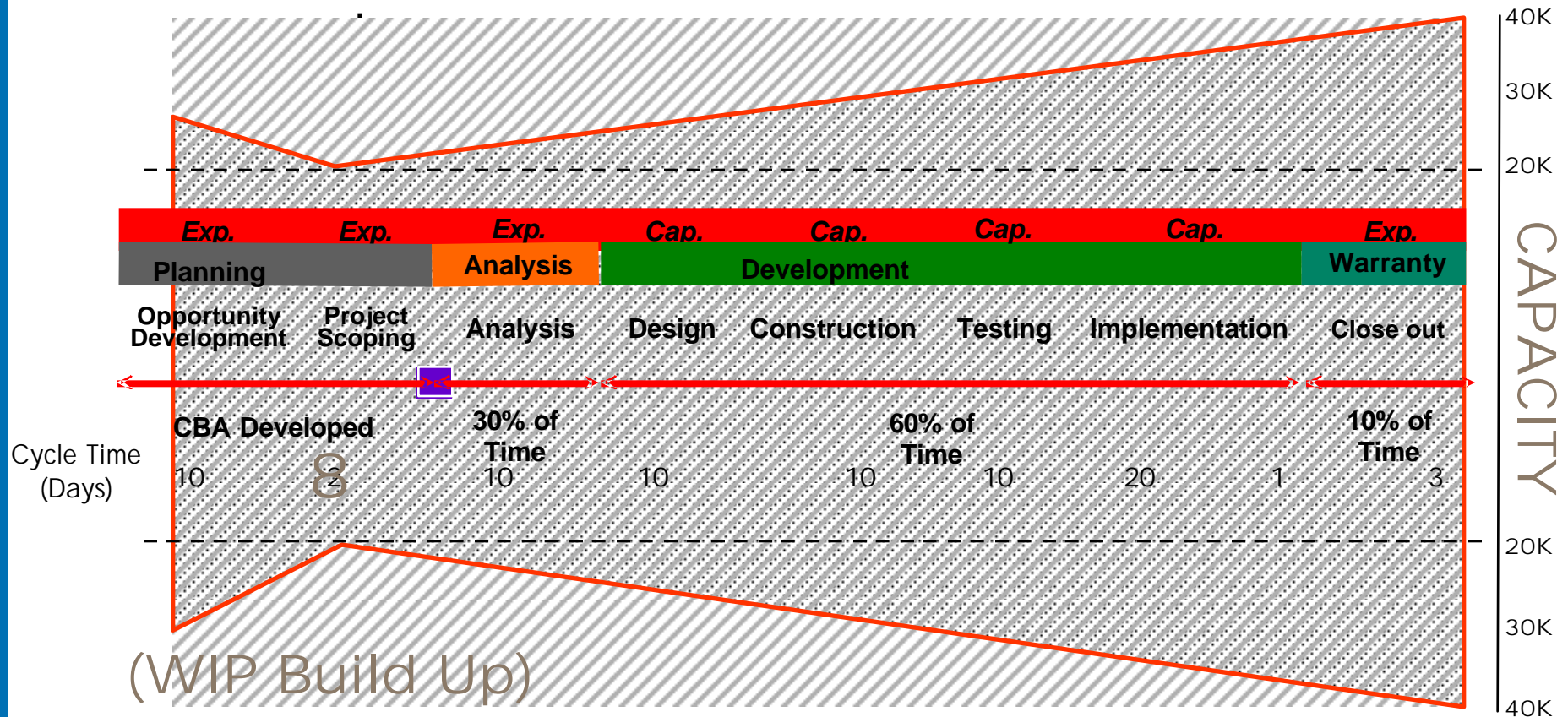
Value Stream Mapping



1. Cause & Effect Analysis



2. Theory of Constraints: Being waste free requires an understanding of the capabilities across the system...



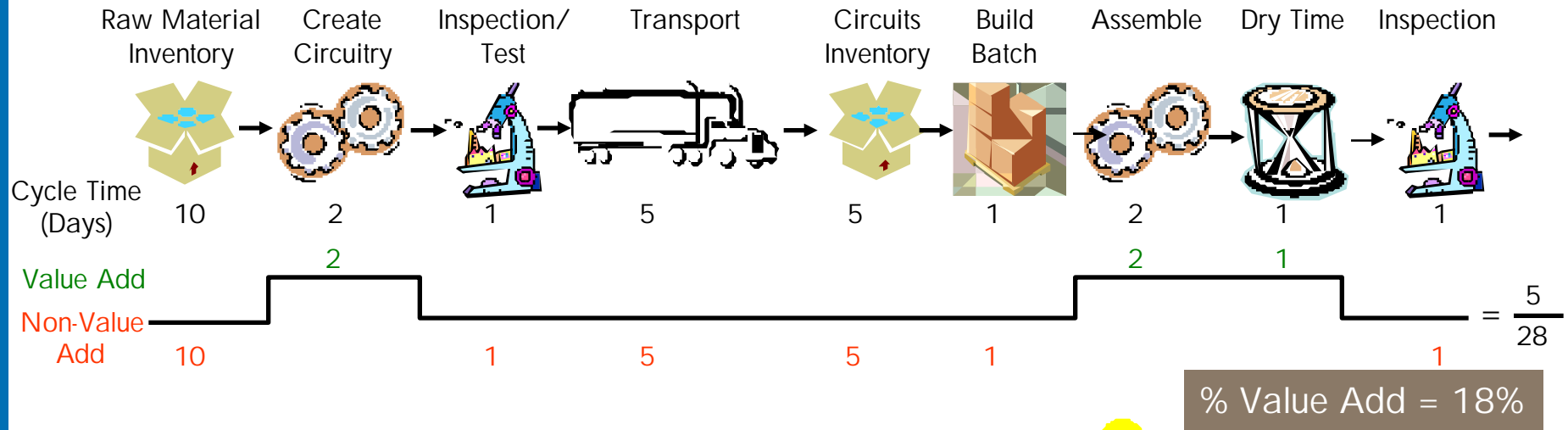
- Over commit the system and we slow the flow,
- Project Scoping demands more resources requiring Multi Tasking of Developers



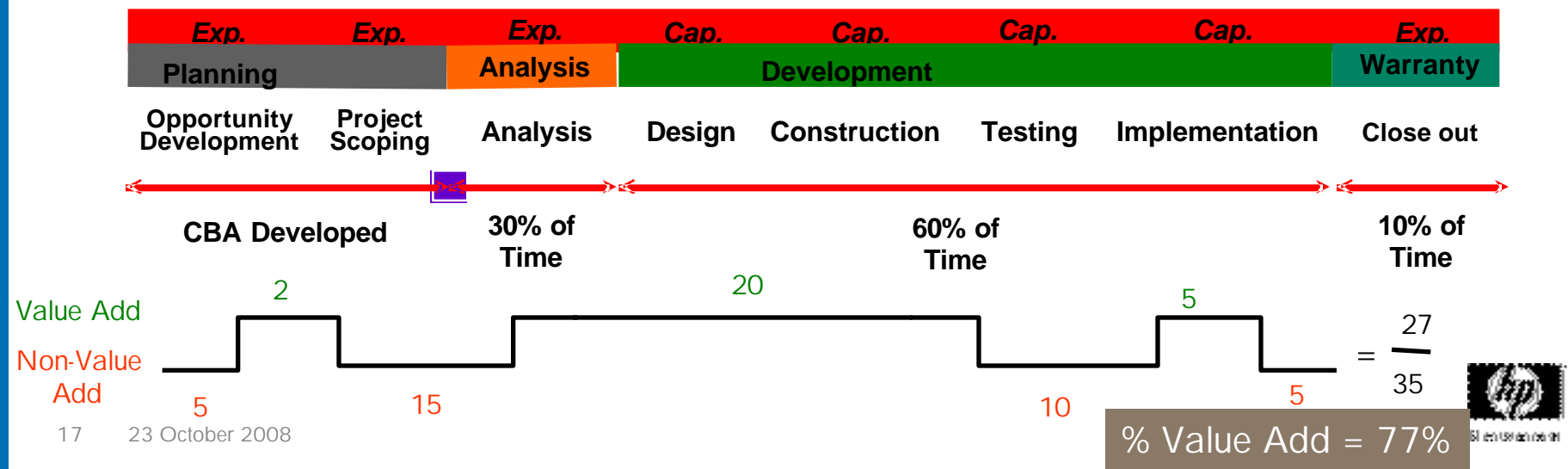
3. Lean Method:

How do your "eyes for waste" see these processes?

A Manufacturing Example Value Stream Map



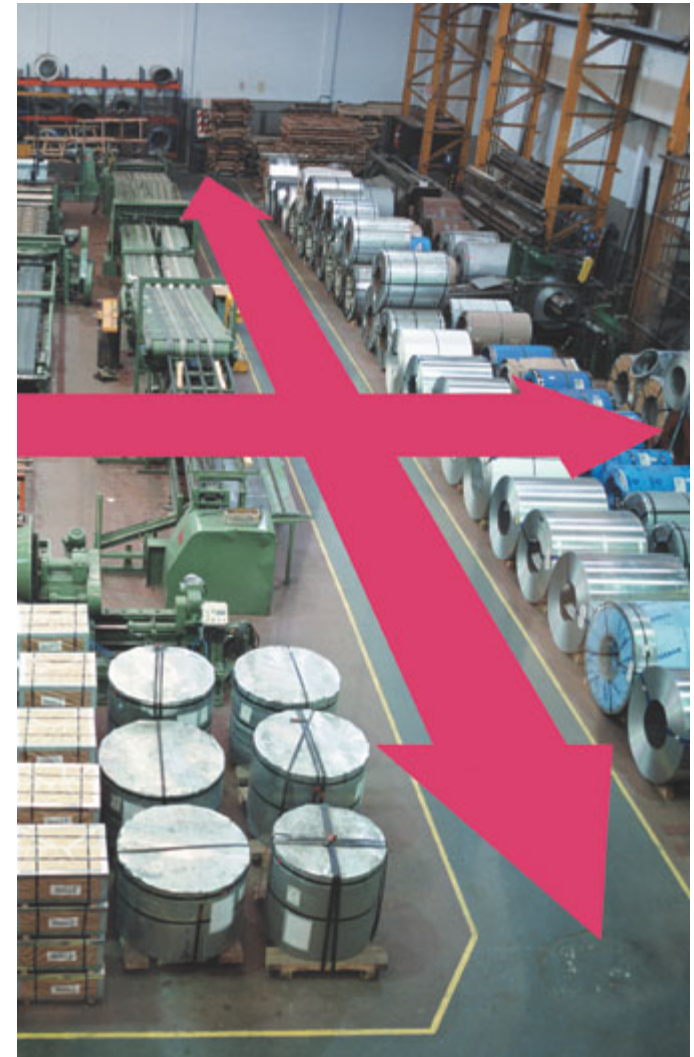
A Software Development Example Value Stream Map



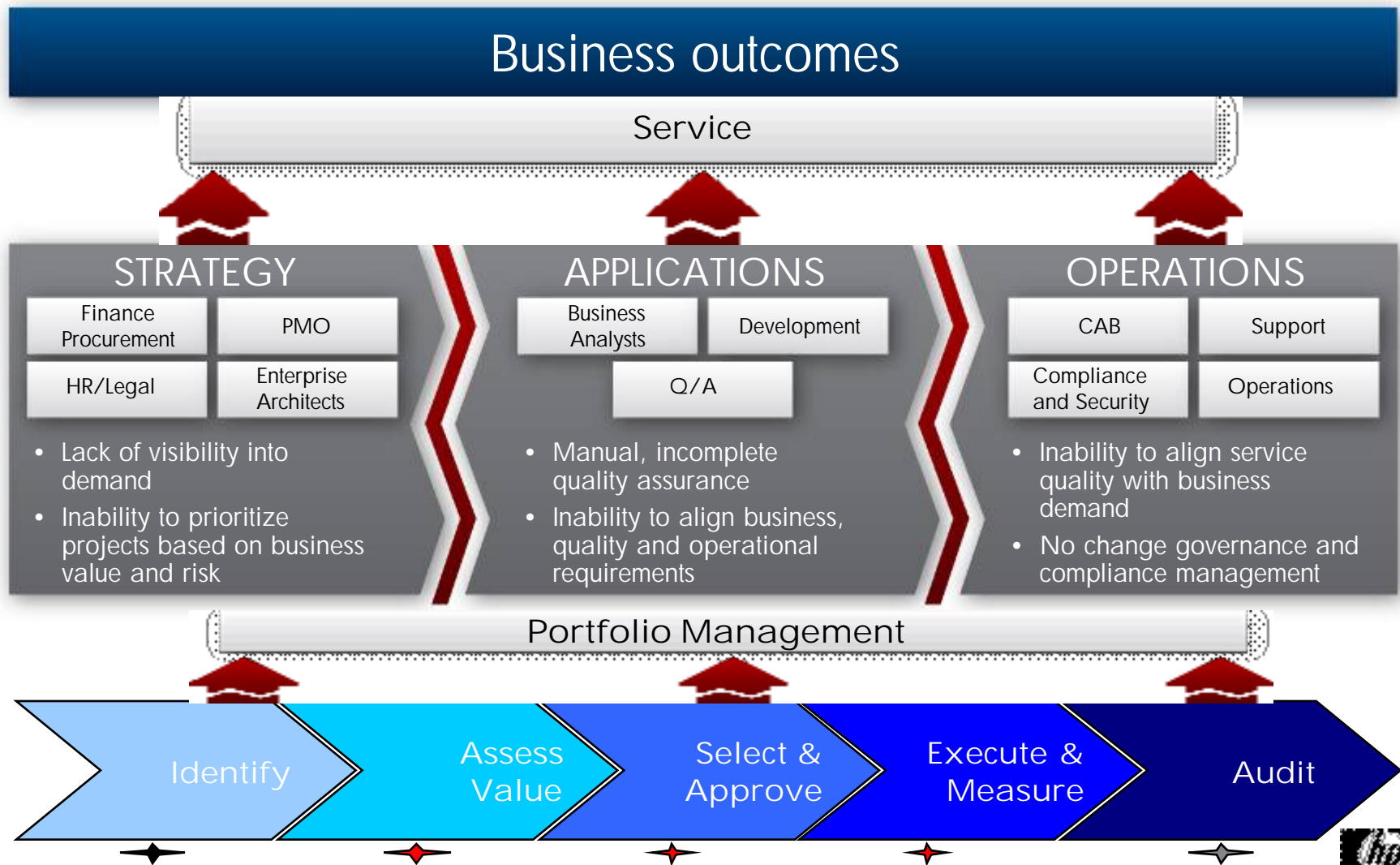
Throughput Improvement Solutions

The key strategy is to eliminate WIP bottleneck and balance new demands to the amount of resources available and the end time it is required (TOC)

- The next strategy is to standardize software development artifacts & automate regression testing (Lean)
- Firmware Example: Firmware team commits to produce only 20 features per release, even if there is 800 coming from marketing (1 month release)
- IT Example: IT breaks all projects into a maximum size of 6 months (The average is 1-2 months)



IT areas of Quality Improvement Focus

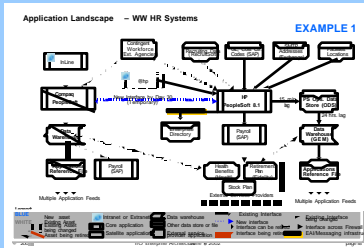


Applications: HP Software Development Process

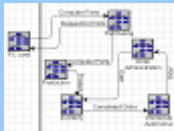
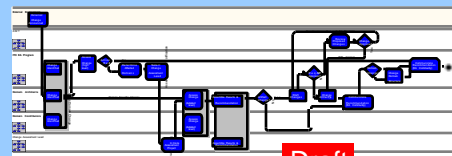
HP Project Architecture Review Process

Legend

- IT Systems Review Board Funding & Prioritization Decision Point
- A



Pathway to Production (P2P)



Question	Answer	Risk Level
1		
2		
3		
4		
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Question	Answer	Risk Level
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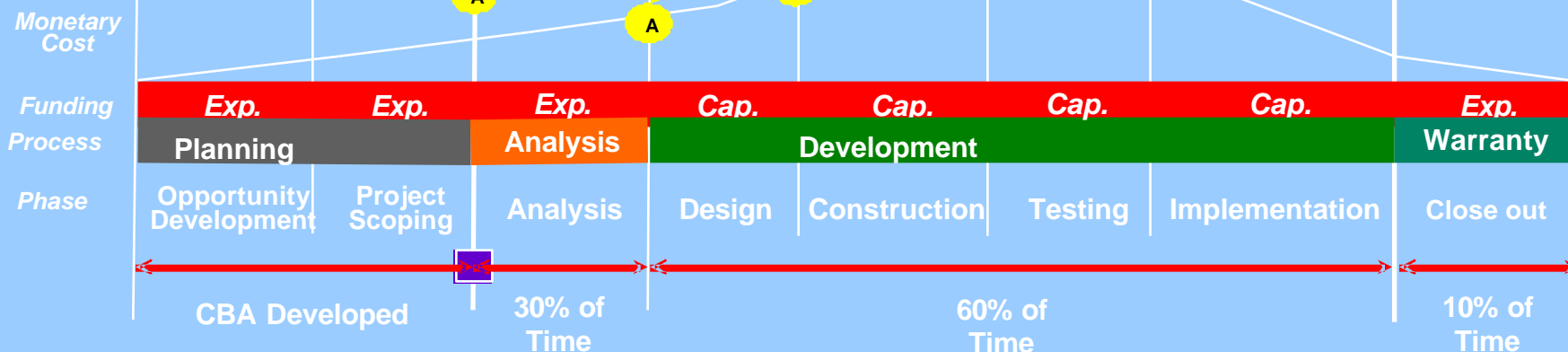
Question	Answer	Risk Level
1		
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- Application Landscape
- Scope- from charter

- BIM
- Workflow Models
- Tech. & Info SummaryDraft

- Tech. & Info SummaryFinal

- Implementation Readiness Summary

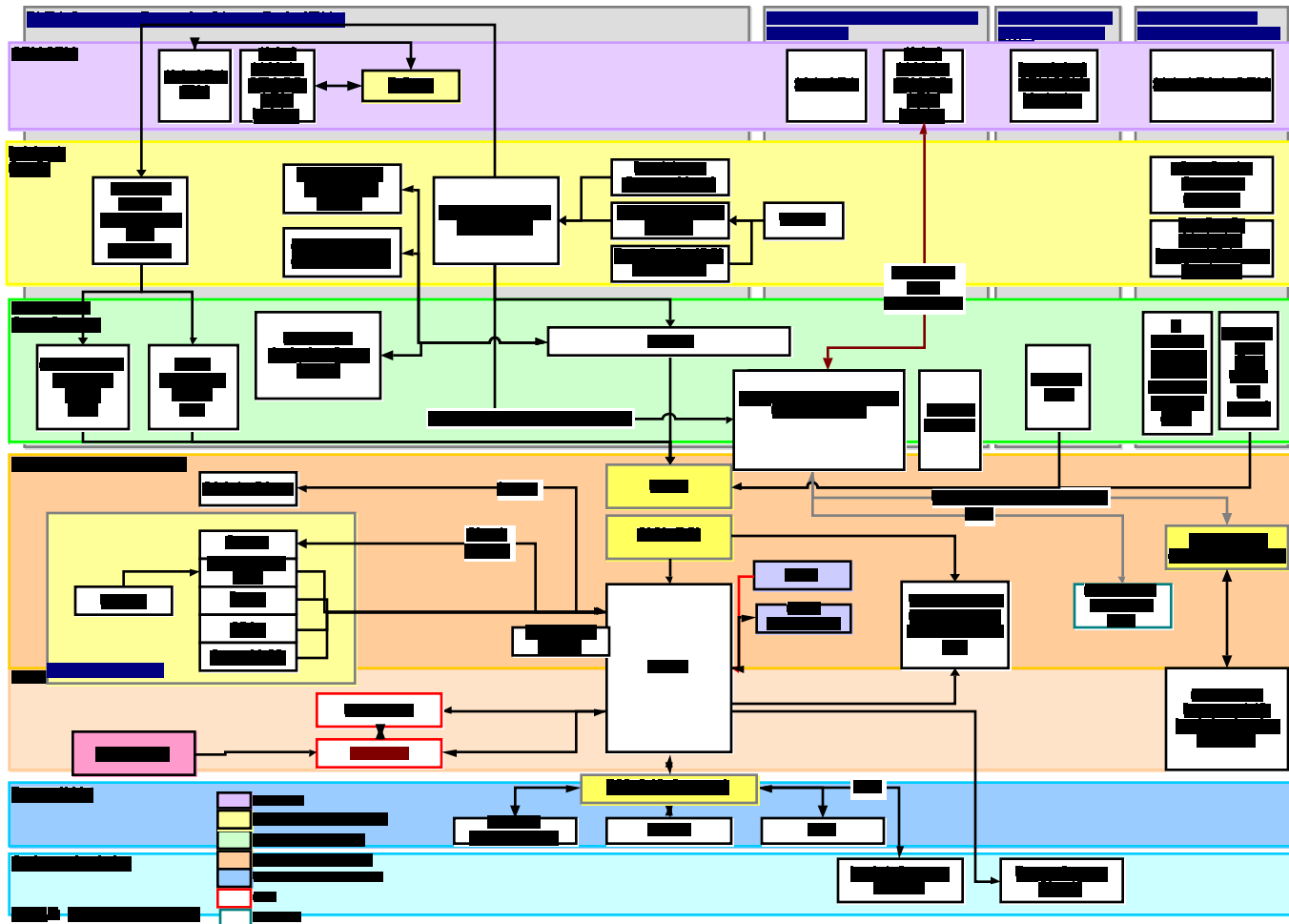


HP IT Methodology Enhanced Deliverables

Process	Initiating & Planning			Executing & Controlling				Closing
Phase	Opp. Dev.	Scoping	Analysis	Design	Construct	Testing	Implement	Closeout
Summary Activities	<ul style="list-style-type: none"> Business Process Design Opportunity Definition Opportunity Assessment 	<ul style="list-style-type: none"> Scope Definition Project Planning Project Assessment 	<ul style="list-style-type: none"> Detailed Business Process Design Business Requirements Definition Build or Buy Analysis 	<ul style="list-style-type: none"> Application Design Conversion Design 	<ul style="list-style-type: none"> Program Development Doc. & Training Development Unit & Integration Testing 	<ul style="list-style-type: none"> System & User Acceptance Testing Operational Readiness Assessment 	<ul style="list-style-type: none"> Training Delivery Software Installation Business Readiness Assessment 	<ul style="list-style-type: none"> Issues Identification & Evaluation Support Development Change Management
<p>ASTA Deliverables</p> <p>PAR Deliverable</p> <p>MOC Deliverables</p>		<ul style="list-style-type: none"> Architecture Review Summary Application Landscape Infrastructure Landscape PAR Scoping Questionnaire Business Case Sponsor Role Map MOC Risk Scoping MOC Plan Sponsor Contract Comm. Plan & Schedule 	<ul style="list-style-type: none"> Review Security Best Practices Technology & Information Summary (draft) Stakeholder Analysis 	<ul style="list-style-type: none"> Run Threat Modeling EMEA Data Privacy Checklist & Questionnaire (if applicable) Application Security Test Plan & Test Cases Technology & Information Summary (final) Change Impact Analysis Employee Commitment Plan 		<ul style="list-style-type: none"> Application Security Review Request from ASTA Implementation Readiness Summary User Adoption Assessment Plan 	<ul style="list-style-type: none"> Resolve all non-compliance security issues 	<ul style="list-style-type: none"> User Adoption Assessment Report

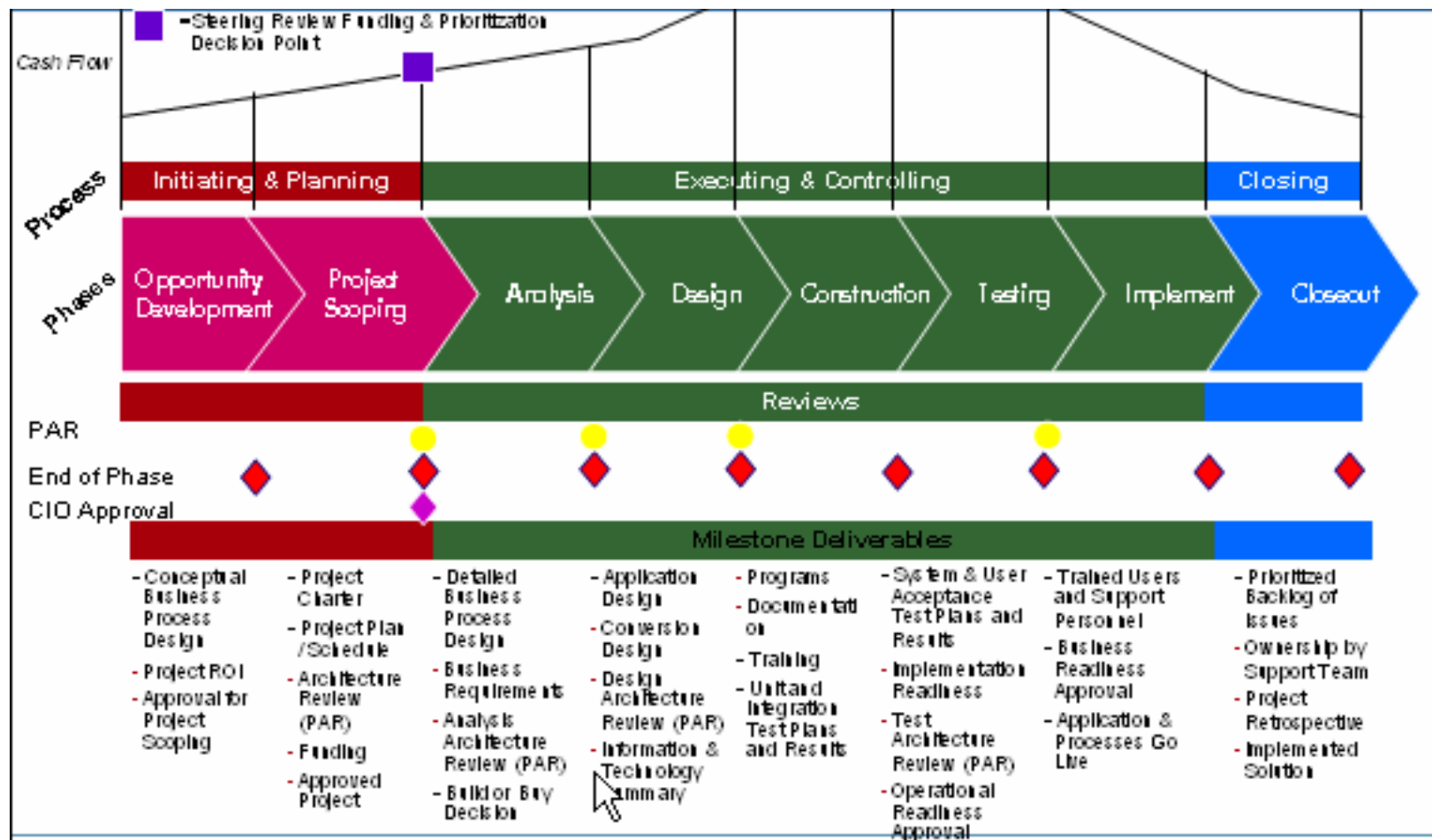


Application Landscape:



Agile Software Development: SCRUM Approach

- Fit Scrum within the Execution phases of the HP LifeCycle (design, construction and testing)

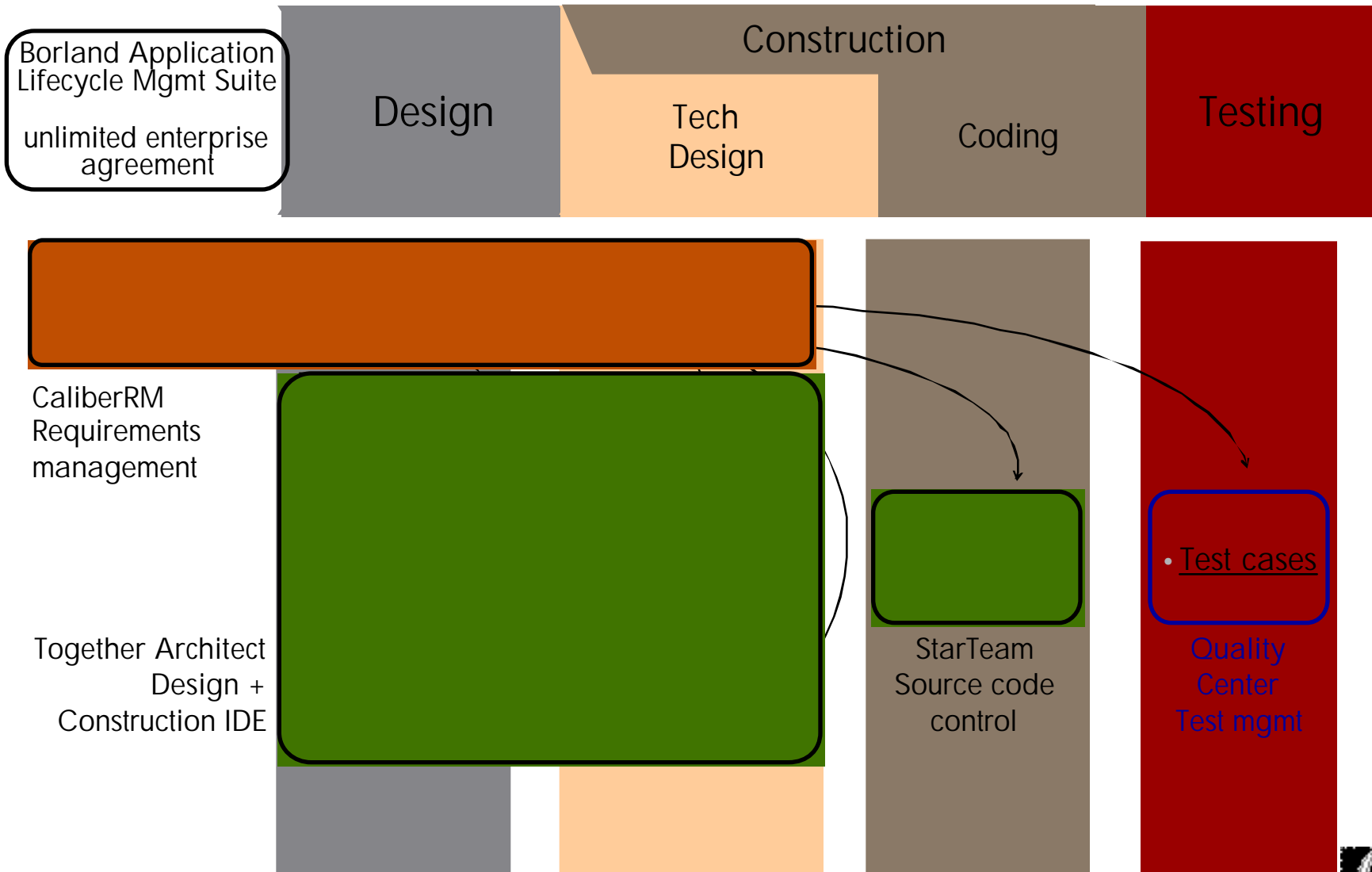


Agile Issues:

- We had two major no-no's – kernel code (no obvious customer)
- Extreme doesn't scale beyond 10 people and doesn't work well across 11 time zones
- We do use the principles and integrated it into the HPME and came up with the 1-2 month IT projects (max 6 months)
- We integrated it into firm ware development to deliver 1 month sprints and we commit to our customers to deliver a certain quantity of functions in one month but not exactly which functions



SLIM Tools Architecture: Tying it all together with traceability



Mercury Quality Center

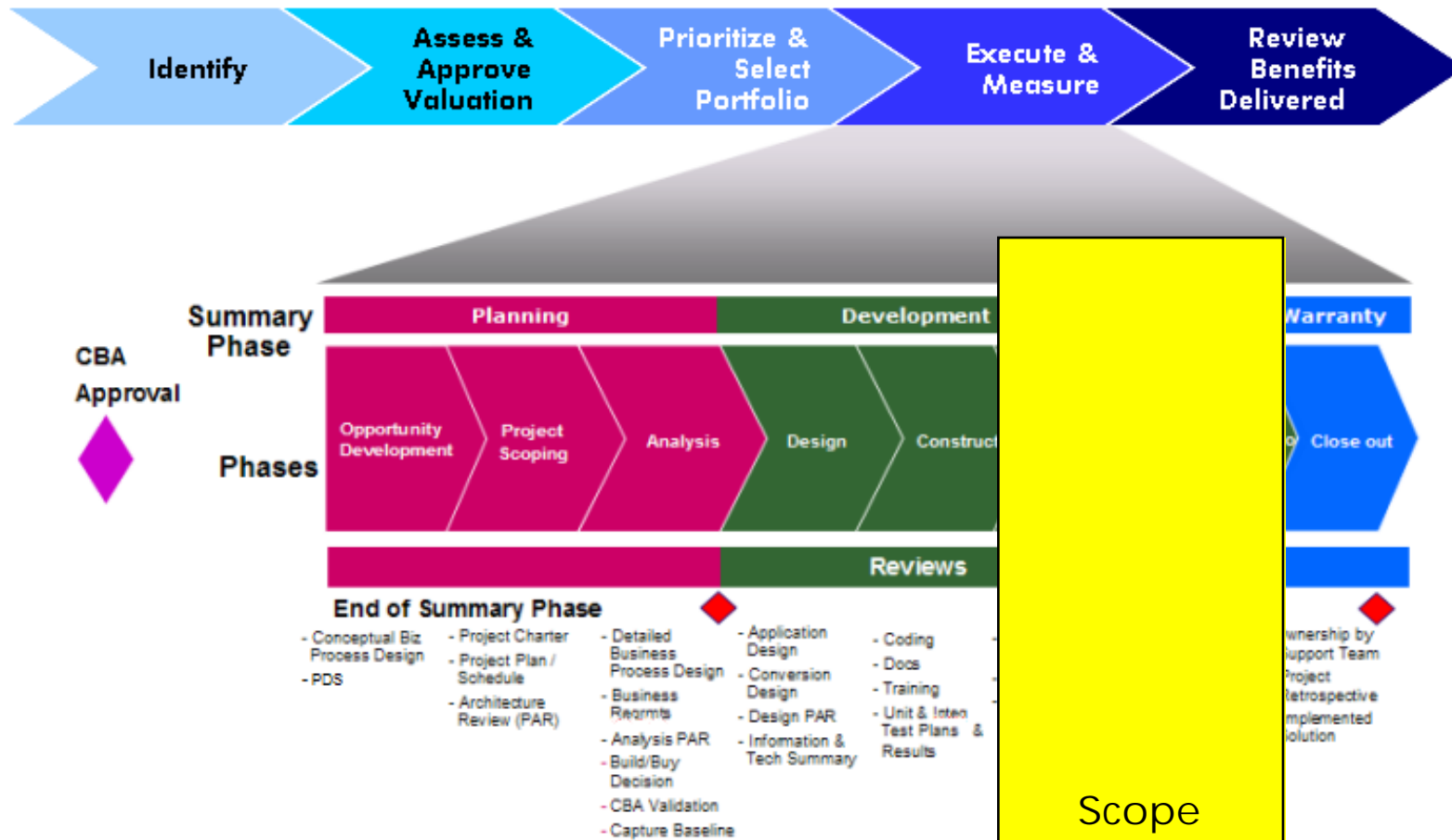
Implementing Mercury Quality Center v9.0 standardizes the testing and defect tracking process to one tool:

- Defect tracking and test tracking will be using standardized data across the organization, which allows for enhanced analysis and reporting
- Aligns the teams to leverage the defect tracking process from project inception, not just when there is development and testing
- Standardizes the test case definitions in such a way that test cases can be easily re-used across multiple releases and can potentially be leveraged across assets if required
- All defects and tests are linked back to requirements, which allows for 'requirements coverage' tracking and analysis of 'defects by requirement' – both new metrics for large releases

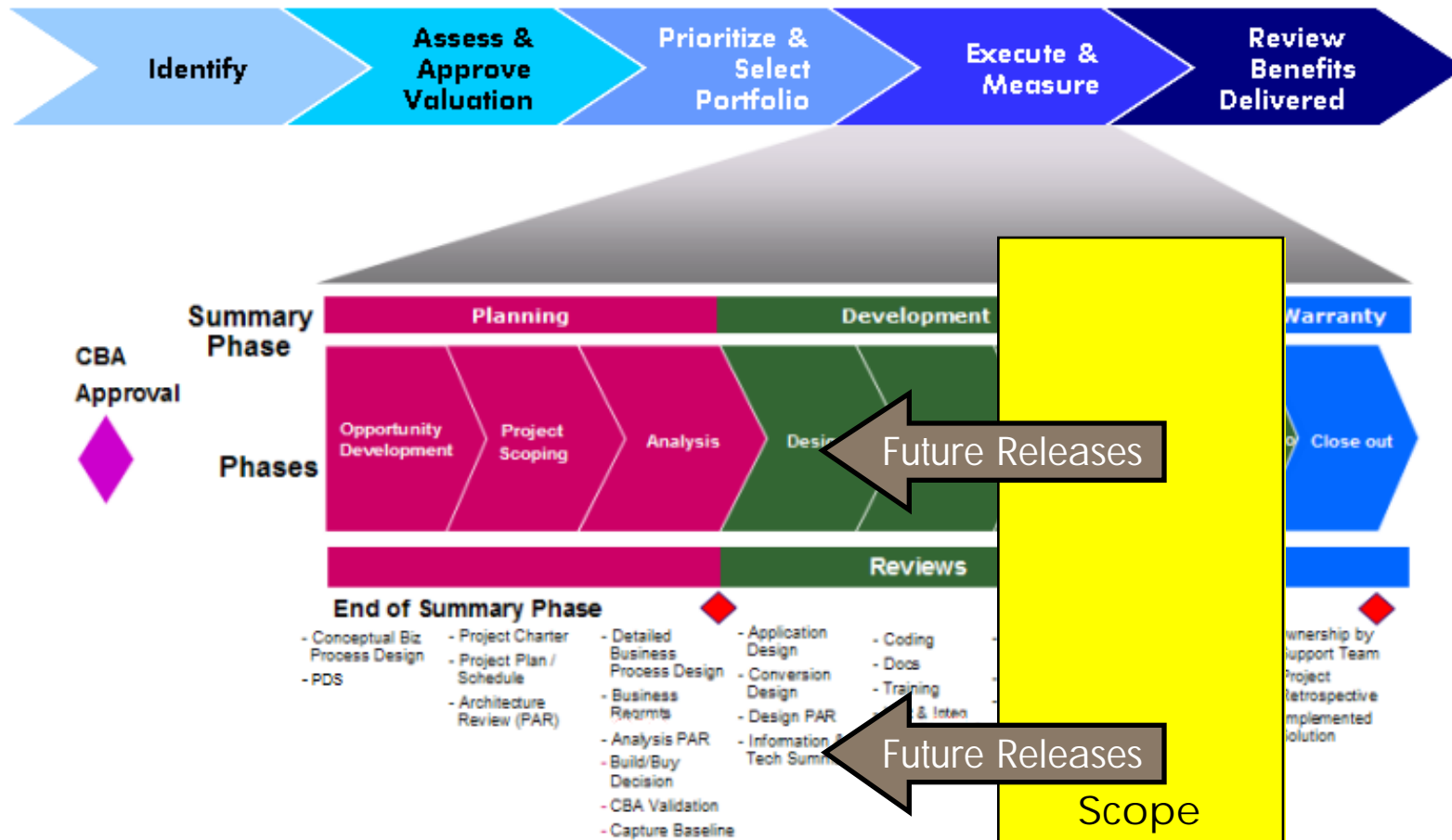


Initial Scope for Mercury QC Usage

Portfolio Management Framework



Future Leverage of Quality Center Portfolio Management Framework



Quality Center at HP



- Use the HP products – HP Mercury Quality Center
- Address with a single tool all the Quality Management aspects
 - Requirements
 - Test plans and Test automation
 - Defects
 - Dashboards
- Currently User Population (May 2008)
 - 17, 269 Registered
 - 5231 Active
 - 696 Concurrent
- 99.99% uptime



Hardware system Regression Testing:

1. The Meatgrinder is a multithreaded test tool application which runs under Microsoft Windows 2000, XP, 2003, Vista and 2008, Linux and HP UX.
2. It allows the user to exert an immense amount of stress on the processors, host bus, memory system, chipset and peripherals by thoroughly exercising most of the machine's major hardware subsystems.
3. Meatgrinder exercises and verifies the standard third party devices on systems using the operating system's or vendor's drivers.



Meatgrinder Tests Broadcom

- Business Need
 - Broadcom is HP's preferred NIC supplier, used across all ESS product lines (BCS, ISS, Blades), and provides superior features and performance to other NIC vendors
- GES contribution
 - ETD Meatgrinder exposed numerous issues with the latest Broadcom drivers including data corruption, connection losses, performance degradation, and interoperability with previous driver versions.
- Value delivered
 - Meatgrinder provides a comprehensive test of both functionality and performance.
 - Reduced warranty costs and production delays



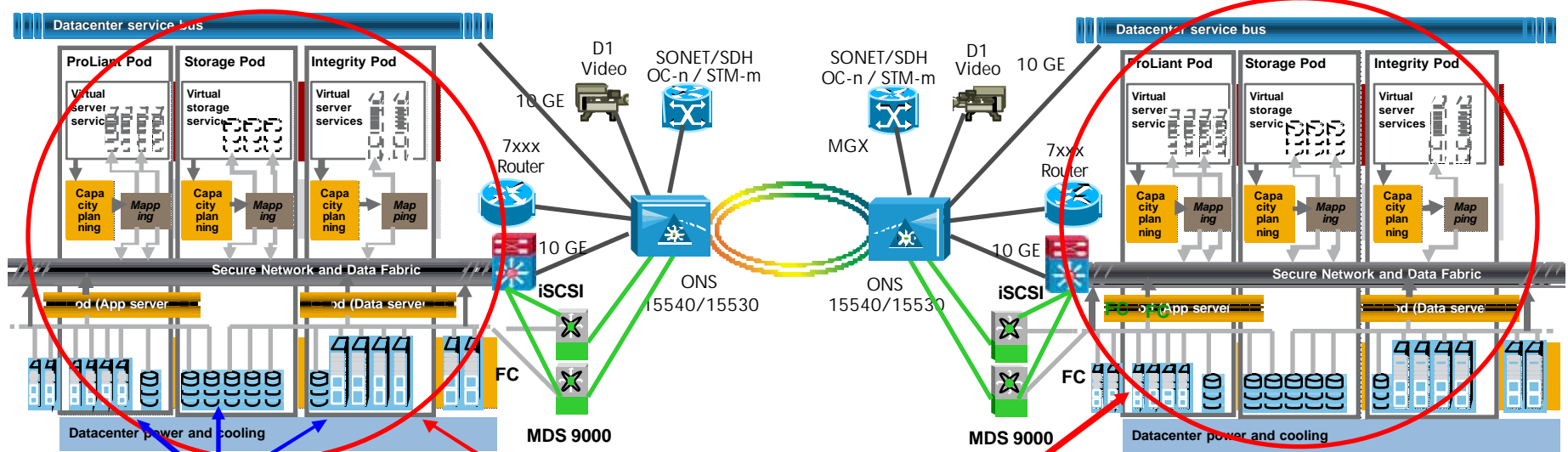
"I am recommending that we baseline future interoperability testing on Meatgrinder."

-- Mark Fletcher,
ISS Problem Resolution

Operations Strategies:

1. Standardized Modular Data Center

Data Center IT Shared Services Catalog



**Standardized
Technology Pods**

Standardized monitoring and Automation tools for Failover and Virtualization

Data centers are the new building blocks;
"the data center is now the computer"



2. Standardize Process: ITILv3

Optimizing Service Support and Delivery

- Service Strategy ●
- Service Design ●
- Service Transition ●
- Service Operations ●
- Continuous improvement ●

- ITILv2 contained "10 processes" in the two core books

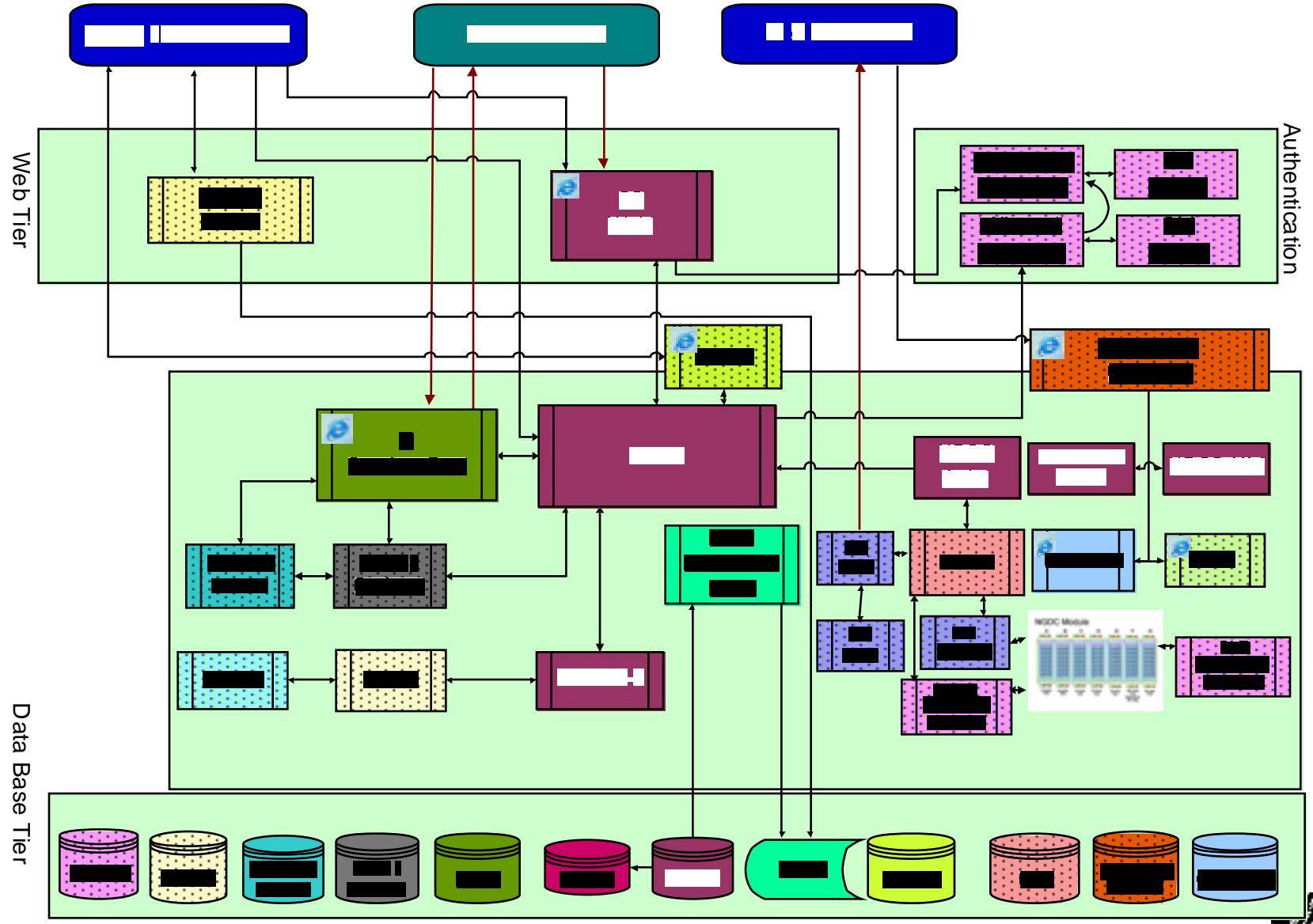
Incident Management	Problem Management	Change Management	Config Management	Release Management
Service Level Management	IT Financial Management	Availability Management	Capacity Management	IT Continuity Management

- ITILv3 contains "27 processes" across the 5 core lifecycle books

Incident Management	Problem Management	Change Management	Service Level Management	Availability Management	IT Financial Management	Capacity Management
	Asset & Config Mgmt	Event Management	Operations Management	Knowledge Management	Service Catalog Management	
	Release & Deployment Mgmt	Demand Management	Service Portfolio Management	Strategy Generation	Information Security Management	
	Service Continuity Management	Supplier Management	Validation & Testing	Transition Planning & Support	Access Management	
	Service Evaluation	Request Fulfillment	Service Improvement	Service Reporting	Service Measurement	

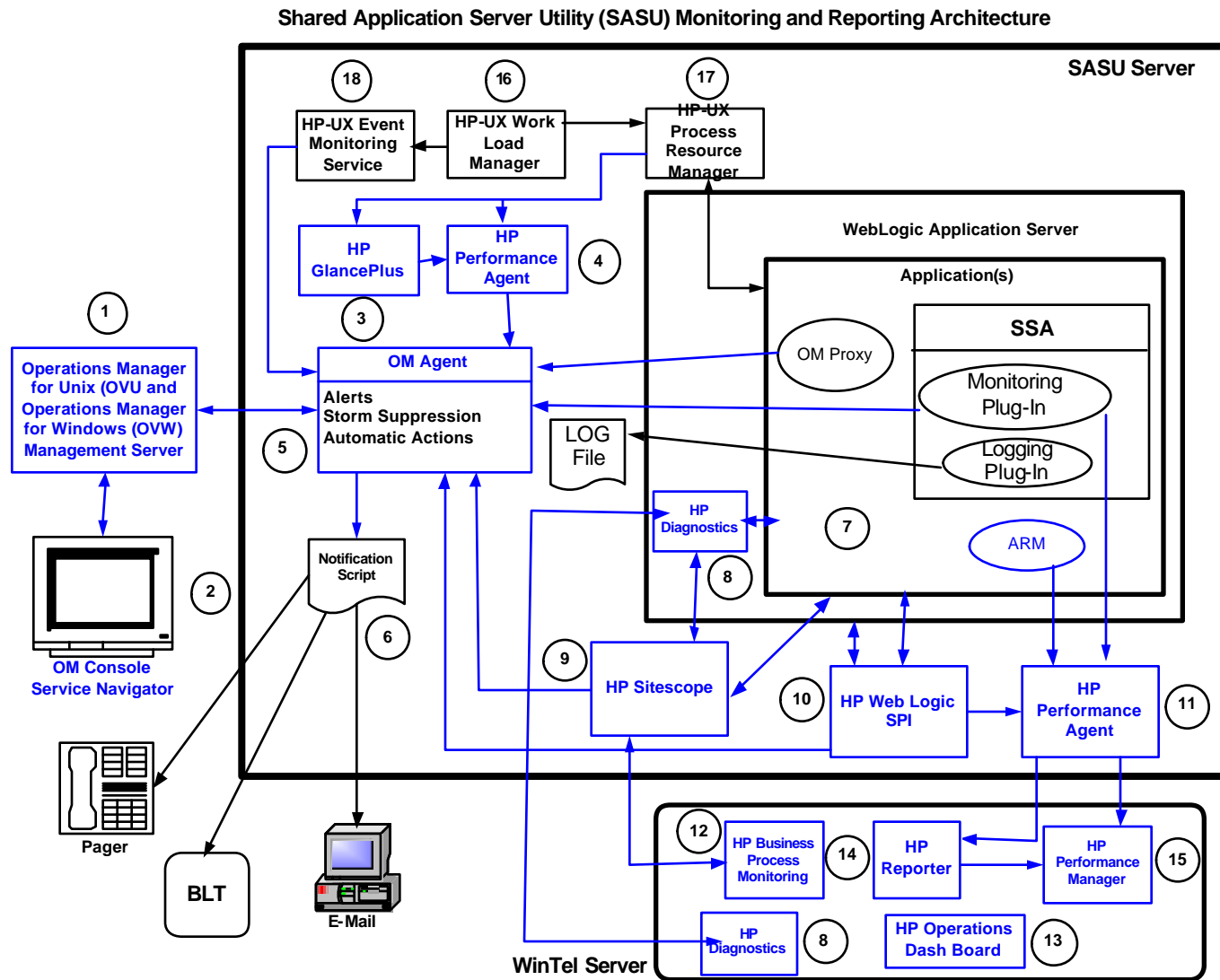


3. Standardize Management Tools: IT HPSC architecture



4. Indepth Monitoring Capability

SASU Monitoring and Reporting Architecture



Quality Improvement Recommendations



1. Key Reliability Mindset changes

- Must value finishing over activity
- Must move from a mentality of start and work on to Start and Finish
- Must recognize that IT does not have value until it is finished
- We must get good before you try to get fast

2. Developing “Eyes for Waste” & “Eyes for Quality”

- Both continuous improvement and breakthrough improvement are driven by critical thinking.



- HP Lean Sigma Yellow/Green Belts are always looking for waste – things that do not add value to the customer.

3. Key Data Center Reliability Tactics

1. Radically standardize everything
2. Carefully analyze gains of virtualization. It introduces additional complexity and maintenance
3. Organize your team to ensure that they had clear accountabilities to reduce work/stabilize systems. Reduction in tickets was an outcome than a goal.
4. Implement a proactive problem mgmt process. We only focused on working on top 3 opportunities at a time.



4. Sap Quality Improvement Tactics

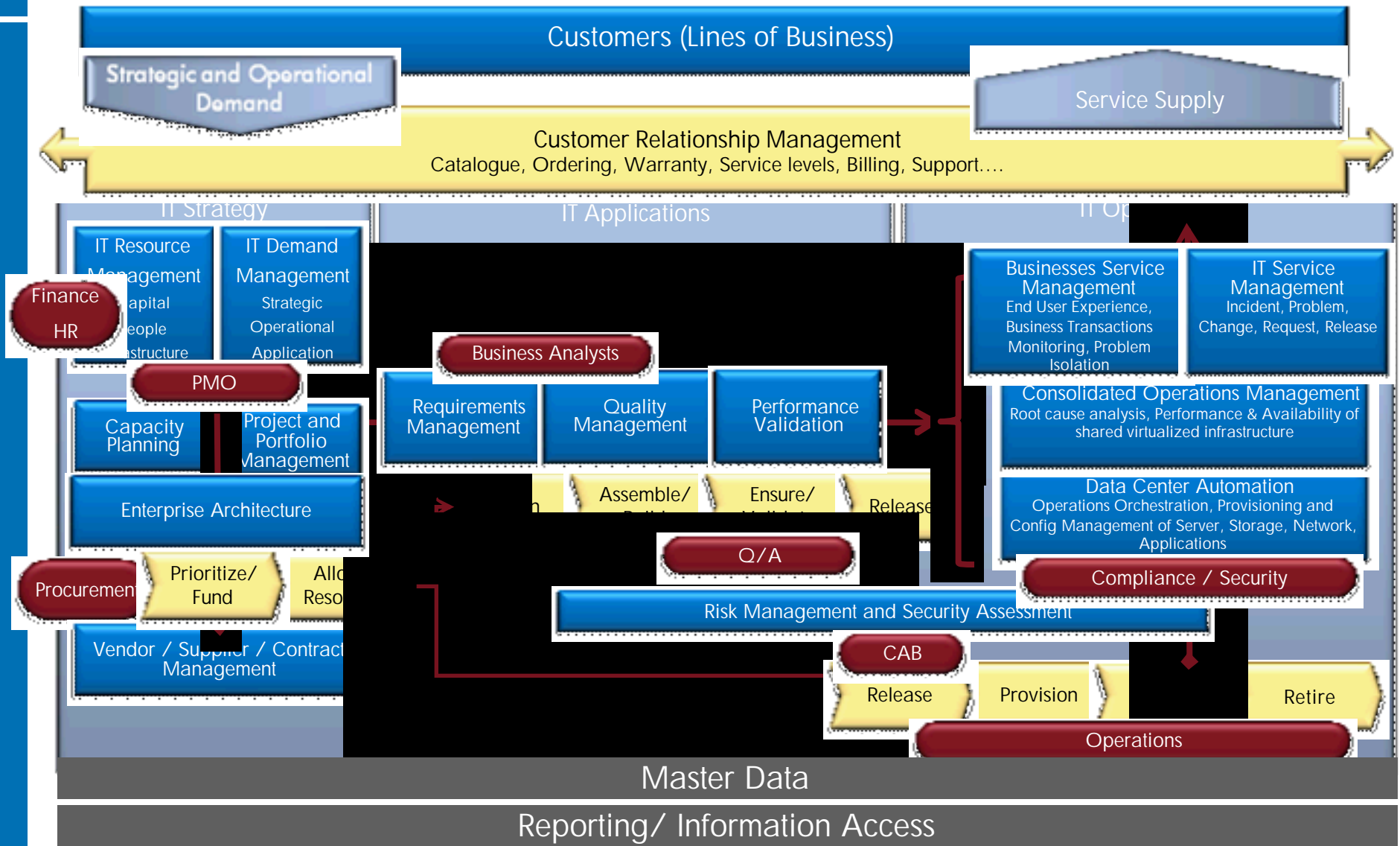
1. Measure your tickets and performance on a almost daily basis.
2. Do away with non-actionable alerts
3. Enhance monitoring to capture alerts that you do not have.
4. Invest in capacity planning to ensure that you know of all projects before they started, and always have 6 months of infrastructure capacity handy.
5. Upgrade infrastructure and versions regularly to the latest versions where possible (this is a never ending battle).
6. Split application across servers when approaching the technical limit of architecture of the application (SAP)
7. Standardize on HP-UX for Mission critical applications like SAP



5. Firmware Quality Achievement Tactics

1. Move from optimizing for the engineer to optimizing for the whole lifecycle Process.
2. Focus on the efficiency (cycle time) of the whole lifecycle process not just the individual engineering task
3. Dramatically reduce WIP and balance the flow through the process this will reduce backlogs and WIP and shorten the sprint cycles
4. Focus on closure, work being done.

6. Implement an End-to-end IT service supply chain



7. Involve the development people

Bill Hewlett on Involving People



“If people have some part in making the decisions that they’re going to be involved with, they’re going to be much more effective in implementing those decisions.”

–Bill Hewlett

1968

